SFUND RECORDS CTR
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SFUND RECORDS CTR
2166-07302

September 29, 1994

EST 1127

Mr. Jody Hill
NUPLA Plastic Corporation
11912 Sheldon Street
Sun Valley, California 91754-2156

Subject: Monitoring of Nested Soil Gas Probes (Second Episode)
NUPLA Plastic Corporation Site
11912 Sheldon Street, Sun Valley, California
(LARWQCB File No. 111.0788)

Dear Mr. Hill:

On September 20, 1994, Environmental Support Technologies, Inc. (EST) re-sampled and re-analyzed two existing multi-depth nested soil gas probe installations at the NUPLA Plastic Corporation site located at 11912 Sheldon Street in Sun Valley, California.

Field analyses results for soil gas samples collected from the nested probe installations are summarized in Table 1. Factors affecting the gas-phase distribution of volatile organic compounds in the subsurface are listed in Appendix A. Field analyses results for soil gas samples, quality assurance/quality control data, and three point calibration data are provided in Appendix B.

Soil gas samples were analyzed using a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and an electrolytic conductivity detector (ELCD) placed in series. The GC configuration used a megabore capillary column to allow resolution and quantitation of EPA Method 8010/8020 compounds, including halogenated and aromatic hydrocarbons. Soil gas sampling and analyses were performed in accordance with Los Angeles Regional Water Quality Control Board (LARWQCB) protocols dated March 8, 1994. Details of EST's standard methods and procedures are provided in Appendix C.

23011 Moulton Parkway • Suite E-6 • Laguna Hills, California 92653 • 714/457-9664 • Fax 714/457-0664

Should you have any questions or comments please contact me at (714) 457-9664.

Sincerely,

Environmental Support Technologies, Inc.

K. A. Thomson

Kirk A. Thomson, R.G., R.E.A.
Project Manager/Principal Hydrogeologist

cc: EST File

TABLE 1

SUMMARY OF FIELD ANALYSES RESULTS FOR SOIL GAS SAMPLES
FROM NESTED PROBE INSTALLATIONS NP1 AND NP2

NUPLA PLASTIC CORPORATION
11912 SHELDON STREET, SUN VALLEY, CALIFORNIA
(concentrations are reported in micrograms per liter (ug/L))

9/29/94

FILE: 127ANPT1.WK3

PROBE NUMBER	DEPTH (feet)	SAMPLING EVENTS (9/20/94)	Date(s) Sampled	FREON 113 (ug/L)	TCE (ug/L)	TCA (ug/L)	DCE (ug/L)	C-1,2-DCE (ug/L)
NP1-10	10	1	03/22/94	ND<1	4	ND<1	ND<1	ND<1
		1	09/20/94	ND<1	ND<1	ND<1	ND<1	ND<1
NP1-20	20	1	03/22/94	ND<1	22	2	1	ND<1
		1	09/20/94	ND<1	7	1	ND<1	ND<1
NP1-30	30	1	03/22/94	ND<1	48	4	3	ND<1
		1	09/20/94	ND<1	17	2	ND<1	ND<1
NP1-40	40	1	03/22/94	ND<1	53	4	4	ND<1
		2	09/20/94	ND<1	24	2	ND<1	ND<1
NP1-50	50	3	03/22/94	ND<1	55	3	3	ND<1
		1	09/20/94	ND<1	18	3	ND<1	ND<1
NP2-10	10	1	03/22/94	222	93	2	ND<1	ND<1
		1	09/20/94	ND<1	25	2	ND<1	1
NP2-20	20	1	03/22/94	ND<1	49	5	3	1
		2	09/20/94	ND<1	37	6	ND<1	4
NP2-30	30	1	03/22/94	ND<1	124	9	8	2
		4	09/20/94	ND<1	51	8	ND<1	5
NP2-40	40	1	03/22/94	ND<1	190	11	9	3
		1	09/20/94	ND<1	34	6	ND<1	3
NP2-50	50	1	03/22/94	ND<1	177	12	9	2
		2	09/20/94	ND<1	52	6	ND<1	3

FREON 113 = 1,1,2-trichlorotrifluoroethane
TCE = trichloroethene
ND = not detected
DCE = 1,1-dichloroethene
C-1,2-DCE = cis-1,2-dichloroethene
TCA = 1,1,1-trichloroethane

LIMITATIONS AND WARRANTIES

This Report on Monitoring of Nested Probes (Second Episode) has been prepared for the exclusive use of NUPLA Corporation and assigned interested parties. The report has been prepared in accordance with generally accepted environmental assessment practices. No other warranty, expressed or implied, is made.

The information provided in this report is based on measurements performed in specific areas during a specific limited period of time. In the event that any changes occur in waste management practices, site conditions, or uses of the property, the conclusions and recommendations contained in this Soil Gas Survey Report should be reviewed and modified or verified in writing by Environmental Support Technologies, Inc.

Soil gas sample analyses are conducted using laboratory-grade gas chromatography equipment. Chemical compound identification is performed using quantitative methods. Chemical compound identities should be verified using gas chromatography/mass spectrometric analyses methods. Soil gas survey data should be used in conjunction with other site specific data.

There is no investigation which is thorough enough to absolutely exclude the presence of hazardous material at the project site. Therefore, if none are identified as part of a limited investigation, such a conclusion should not be construed as a guaranteed absence of such materials, but merely the results of an investigation. EST, despite the use of reasonable care and a commitment to professional excellence, may not identify the presence of hazardous materials and hazardous compound concentrations in soil, soil gas, and/or groundwater. EST assumes no responsibility for conditions not investigated or for conditions not generally recognized as environmentally unacceptable, at the time of the investigation.

Kirk A. Thomson, R.G., R.E.A.

David M. Pride, Senior Env. Chemist

APPENDICES

Appendix A

FACTORS AFFECTING THE GAS-PHASE DISTRIBUTION OF VOCs IN THE SUBSURFACE

Soil and groundwater contamination by volatile organic compounds (VOCs) can often be detected by analyzing trace gases in soil just below ground surface. This technique is possible because many VOCs will volatilize and move by molecular diffusion away from source areas toward regions of lower concentrations. A gas phase concentration gradient from the source to adjacent areas is established.

The following factors affect the transport and gas phase distribution of VOCs in the subsurface.

1. The liquid-gas partitioning coefficient of the compounds of interest (the "volatility" of the compound).

2. The vapor diffusivity, which is a measure of how quickly an individual compound "spreads out" within a volume of gas.

3. Retardation of the individual compounds as they migrate in the soil gas. Retardation may be due to degradation, adsorption on the soil matrix, tortuosity of the soil profile, or entrapment in unconnected pores.

4. The presence of impeding layers, wetting fronts of freshwater, or perched water tables, between the regional water table and ground surface.

5. The presence of soil moisture around man-made structures such as clarifiers and sumps may suppress volatilization and diffusion of VOCs resulting in false negative or low soil gas concentrations.

6. The presence of contaminants from localized spills or in the ambient air.

7. Movement of soil gas in response to barometric pressure changes.

8. The preferential migration of gas through zones of greater permeability (e.g. natural lithologic variation or back-fill of underground utilities).

At most sites, many of these factors are unknown or poorly understood. Because of this uncertainty, soil gas sampling should be used in conjunction with other site-specific data.

Appendix B

FIELD ANALYSES RESULTS FOR HALOGENATED AND AROMATIC HYDROCARBONS

(INCLUDING CALIBRATION REPORTS, QUALITY CONTROL REPORTS, AND EXPLANATION OF METHOD DETECTION LIMITS)

TABLE B-1
HALOGENATED AND AROMATIC HYDROCARBONS
FIELD ANALYSES RESULTS FOR SOIL GAS SAMPLES
NUPLA CORPORATION, SUN VALLEY, CALIFORNIA
25-TARGET COMPOUND LIST

PID/ELCD #2 - 9/20/94
FILE: 127ANPRP.WK3

SAMPLE ID			NP2-40	NP2-30	NP2-20	NP2-20	NP2-10	NP2-30	NP2-30	NP2-30
DATE			9/20/94	9/20/94	9/20/94	9/20/94	9/20/94	9/20/94	9/20/94	9/20/94
TIME			12:21	12:44	13:03	13:19	13:44	14:04	14:21	14:44
INJECTION VOLUME (ul)			500	500	500	200	500	250	250	250
PURGE VOLUME (ml)			600	400	300	300	200	500	500	500
VACUUM (in. Hg)			ND	ND	ND	ND	ND	ND	ND	ND
DILUTION FACTOR			1.0	1.0	1.0	2.5	1.0	2.0	2.0	2.0
COMMENTS								SYRINGE LEAK ?	SEPTUM LEAK	
	RT	ARF								
Dichlorodifluromethane	3:60	1.34E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Vinyl chloride	4:21	1.02E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Chloroethane	4:70	2.10E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichlorofluoromethane	4:94	3.94E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2-Trichloro-trifluoroethane	5:37	3.34E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1-Dichloroethene	5:65	4.64E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Methylene chloride	6:16	6.81E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
trans-1,2-Dichloroethene	6:48	5.76E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1-Dichloroethane	6:95	6.16E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
cis-1,2-Dichloroethene	7:67	4.95E+09	8.20E+06 3	1.18E+07 5	1.05E+07 4	1.45E+06 ND<2.5	2.83E+06 1	1.45E+06 ND<2	0.00E+00 ND	4.49E+06 4
Chloroform	7:88	8.10E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,1-Trichloroethane	8:39	7.19E+09	2.06E+07 6	2.70E+07 8	2.19E+07 6	4.31E+06 3	8.00E+06 2	4.18E+06 2	0.00E+00 ND	1.46E+07 8
Carbon Tetrachloride	8:76	6.61E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Benzene	8:97	3.40E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,2-Dichloroethane	8:90	7.57E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichloroethene	9:81	7.21E+09	1.21E+08 34	1.45E+08 40	1.33E+08 37	4.22E+07 29	9.18E+07 25	4.09E+07 23	0.00E+00 ND	9.14E+07 51
Toluene	11:94	2.93E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2-Trichlorethane	12:49	6.59E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Tetrachloroethene	13:09	7.01E+09	1.15E+06 ND	1.50E+06 ND	1.73E+06 ND	1.73E+06 ND<2.5	1.95E+06 ND	2.89E+05 ND<2	0.00E+00 ND	1.24E+06 ND<2
1,1,1,2-Tetrachloroethane	14:68	6.48E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Ethylbenzene	14:70	2.51E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
meta and para-Xylene	14:84	6.50E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
ortho-Xylene	15:70	2.72E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2,2-Tetrachloroethane	16:65	6.05E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND

ND = not detected; analyte is below the reportable limit of quantitation for this sample
RT = retention time
ul = microliter
in. Hg = inches of mercury

Concentrations reported in micrograms per liter (ug/L)
ARF = average response factor
ml = milliliter

9/20/94

ANALYST : David M. Pride

REVIEWED BY : Ragi Abraham

TABLE B–1
HALOGENATED AND AROMATIC HYDROCARBONS
FIELD ANALYSES RESULTS FOR SOIL GAS SAMPLES
NUPLA CORPORATION, SUN VALLEY, CALIFORNIA
25–TARGET COMPOUND LIST

PID/ELCD #2 – 9/20/94
FILE: 127ANPRP.WK3

SAMPLE ID			NP1–50	NP1–40	NP1–30	NP1–20	NP1–10	NP1–40	NP2–50	NP2–50
DATE			9/20/94	9/20/94	9/20/94	9/20/94	9/20/94	9/20/94	9/20/94	9/20/94
TIME			09:52	10:09	10:25	10:43	11:00	11:16	11:46	12:03
INJECTION VOLUME (ul)			500	500	500	500	500	500	500	250
PURGE VOLUME (ml)			700	600	400	300	200	700	700	700
VACUUM (in. Hg)			ND	ND	ND	ND	ND	ND	ND	ND
DILUTION FACTOR			1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
COMMENTS	RT	ARF								
Dichlorodifluromethane	3:80	1.34E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Vinyl chloride	4:21	1.02E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Chloroethane	4:70	2.10E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichlorofluoromethane	4:94	3.94E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2–Trichloro–trifluoroethane	5:37	3.34E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1–Dichloroethene	5:65	4.64E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Methylene chloride	6:16	6.81E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
trans–1,2–Dichloroethene	6:48	5.76E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1–Dichloroethane	6:95	6.16E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
cis–1,2–Dichloroethene	7:67	4.95E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	8.26E+06 3	3.94E+06 3
Chloroform	7:88	8.10E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,1–Trichloroethane	8:39	7.19E+09	1.04E+07 3	1.02E+06 ND	6.03E+06 2	2.74E+06 1	2.11E+05 ND	8.49E+06 2	1.31E+07 4	1.05E+07 6
Carbon tetrachloride	8:76	6.61E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Benzene	8:97	3.40E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,2–Dichloroethane	8:90	7.57E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichloroethene	9:81	7.21E+09	6.66E+07 18	8.86E+06 2	6.22E+07 17	2.35E+07 7	1.90E+06 ND	8.55E+07 24	1.40E+08 39	9.34E+07 52
Toluene	11:94	2.93E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2–Trichlorethane	12:49	6.59E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Tetrachloroethene	13:09	7.01E+09	8.36E+05 ND	0.00E+00 ND	7.84E+05 ND	4.78E+05 ND	0.00E+00 ND	9.68E+05 ND	1.14E+06 ND	9.69E+05 ND<2
1,1,1,2–Tetrachloroethane	14:68	6.48E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Ethylbenzene	14:70	2.51E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
meta and para–Xylene	14:84	6.50E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
ortho–Xylene	15:70	2.72E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2,2–Tetrachloroethane	16:65	6.05E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND

ND = not detected; analyte is below the reportable limit of quantitation for this sample
RT = retention time
ul = microliter
in. Hg = inches of mercury

Concentrations reported in micrograms per liter (ug/L)
ARF = average response factor
ml = milliliter

9/20/94

ANALYST : David M. Pride

REVIEWED BY : Ragi Abraham

TABLE B-2
QUALITY ASSURANCE/QUALITY CONTROL REPORT
LABORATORY CONTROL SAMPLE, BLANK ANALYSIS, AND LAST GC TEST RUN
SEPTEMBER 20, 1994

PID/ELCD #1

FILE: 127ANPQC.WK

		DAILY MID-POINT			BLANK	LAST GC TEST RUN		
STANDARD CONC. (ug/L) INJECTION VOLUME(uL) COMPOUND/WEIGHT(ug)	RT	5000 1.00 0.00500	AVERAGE RESPONSE FACTOR	PERCENT DIFFERENCE	AMBIENT AIR 500	5000 1.00 0.00500	AVERAGE RESPONSE FACTOR	PERCENT DIFFERENCE
Dichlorodifluoromethane	3:82	0			0.00E+00	0		
RF		0.00E+00	1.34E+08	NA	ND	0.00E+00	1.34E+08	NA
Vinyl chloride	4:22	0			0.00E+00	0		
RF		0.00E+00	1.02E+09	NA	ND	0.00E+00	1.02E+09	NA
Chloroethane	4:71	0			0.00E+00	0		
RF		0.00E+00	2.10E+09	NA	ND	0.00E+00	2.10E+09	NA
Trichlorofluoromethane	4:96	0			0.00E+00	0		
RF		0.00E+00	3.94E+09	NA	ND	0.00E+00	3.94E+09	NA
1,1,2-Trichloro-trifluoroethane	5:39	0			0.00E+00	0		
RF		0.00E+00	3.34E+09	NA	ND	0.00E+00	3.34E+09	NA
1,1-Dichloroethene	5:66	20681520			0.00E+00	27185552		
RF		4.14E+09	4.64E+09	-11	ND	5.44E+09	4.64E+09	17
Methylene Chloride	6:17	0			0.00E+00	0		
RF		0.00E+00	6.81E+09	NA	ND	0.00E+00	6.81E+09	NA
trans-1,2-Dichloroethene	6:49	25190464			0.00E+00	32066784		
RF		5.04E+09	5.76E+09	-13	ND	6.41E+09	5.76E+09	11
1,1-Dichloroethane	6:96	27022112			0.00E+00	29646400		
RF		5.40E+09	6.16E+09	-12	ND	5.93E+09	6.16E+09	-4
Cis-1,2-Dichloroethene	7:68	27255248			0.00E+00	26045264		
RF		5.45E+09	4.95E+09	10	ND	5.21E+09	4.95E+09	5
Chloroform	7:90	0			0.00E+00	0		
RF		0.00E+00	8.10E+09	NA	ND	0.00E+00	8.10E+09	NA
1,1,1-Trichloroethane	8:40	33675232			0.00E+00	38156960		
RF		6.74E+09	7.19E+09	-6	ND	7.63E+09	7.19E+09	6
Carbon tetrachloride	8:78	0			0.00E+00	0		
RF		0.00E+00	6.61E+09	NA	ND	0.00E+00	6.61E+09	NA
Benzene (PID)	8:99	171074			0.00E+00	147092		
RF		3.42E+07	3.40E+07	1	ND	2.94E+07	3.40E+07	-13
1,2-Dichloroethane	8:93	35071808			0.00E+00	33471504		
RF		7.01E+09	7.57E+09	-7	ND	6.69E+09	7.57E+09	-12
Trichloroethene	9:84	35696512			0.00E+00	41467424		
RF		7.14E+09	7.21E+09	-1	ND	8.29E+09	7.21E+09	15
Toluene (PID)	11:92	148805			0.00E+00	141658		
RF		2.98E+07	2.93E+07	2	ND	2.83E+07	2.93E+07	-3
1,1,2-Trichloroethane	12:47	32967600			0.00E+00	38880768		
RF		6.59E+09	6.59E+09	0	ND	7.78E+09	6.59E+09	18
Tetrachloroethene	13:12	34558592			0.00E+00	32222528		
RF		6.91E+09	7.01E+09	-1	ND	6.44E+09	7.01E+09	-8
1,1,1,2-Tetrachloroethane	14:69	0			0.00E+00	0		
RF		0.00E+00	6.48E+09	NA	ND	0.00E+00	6.48E+09	NA
Ethylbenzene (PID)	14:68	0			0.00E+00	0		
RF		0.00E+00	2.51E+07	NA	ND	0.00E+00	2.51E+07	NA
m,p-Xylene (PID)	15:69	312299			0.00E+00	299595		
RF		6.25E+07	6.50E+07	-4	ND	5.99E+07	6.50E+07	-8
o-Xylene (PID)	15:69	125586			0.00E+00	122626		
RF		2.51E+07	2.72E+07	-8	ND	2.45E+07	2.72E+07	-10
1,1,2,2-Tetrachloroethane	16:82	0			0.00E+00	0		
RF		0.00E+00	6.05E+09	NA	ND	0.00E+00	6.05E+09	NA

RT = retention time
RF = response factor
NA = not analyzed

ug/L = micrograms per liter
uL = microliter
ug = microgram

9/20/94

Analyst : David M. Pride

Reviewed by : Ragi Abraham

TABLE B-2
QUALITY ASSURANCE/QUALITY CONTROL REPORT
LABORATORY CONTROL SAMPLE, BLANK ANALYSIS, AND LAST GC TEST RUN
SEPTEMBER 19, 1994

PID/ELCD #1

FILE: 919AQCLC.WK

		LAB CONTROL SAMPLE			BLANK	LAST GC TEST RUN		
STANDARD CONC. (ug/L)		5000	AVERAGE		AMBIENT AIR	5000	AVERAGE	
INJECTION VOLUME(uL)		1.00	RESPONSE	PERCENT	500	1.00	RESPONSE	PERCENT
COMPOUND/WEIGHT(ug)	RT	0.00500	FACTOR	DIFFERENCE		0.00500	FACTOR	DIFFERENCE
Dichlorodifluoromethane	3:82	730900			0.00E+00	0		
RF		1.46E+08	1.34E+08	9	ND	0.00E+00	1.34E+08	NA
Vinyl chloride	4:22	5040797			0.00E+00	0		
RF		1.01E+09	1.02E+09	-1	ND	0.00E+00	1.02E+09	NA
Chloroethane	4:71	9140998			0.00E+00	0		
RF		1.83E+09	2.10E+09	-13	ND	0.00E+00	2.10E+09	NA
Trichlorofluoromethane	4:96	17287664			0.00E+00	0		
RF		3.46E+09	3.94E+09	-12	ND	0.00E+00	3.94E+09	NA
1,1,2-Trichloro-trifluoroethane	5:39	14970776			0.00E+00	0		
RF		2.99E+09	3.34E+09	-10	ND	0.00E+00	3.34E+09	NA
1,1-Dichloroethene	5:66	25627952			0.00E+00	0		
RF		5.13E+09	4.64E+09	10	ND	0.00E+00	4.64E+09	NA
Methylene Chloride	6:17	34609536			0.00E+00	0		
RF		6.92E+09	6.81E+09	2	ND	0.00E+00	6.81E+09	NA
trans-1,2-Dichloroethene	6:49	29917184			0.00E+00	0		
RF		5.98E+09	5.76E+09	4	ND	0.00E+00	5.76E+09	NA
1,1-Dichloroethane	6:96	26552224			0.00E+00	0		
RF		5.31E+09	6.16E+09	-14	ND	0.00E+00	6.16E+09	NA
Cis-1,2-Dichloroethene	7:68	27071680			0.00E+00	0		
RF		5.41E+09	4.95E+09	9	ND	0.00E+00	4.95E+09	NA
Chloroform	7:90	40796800			0.00E+00	0		
RF		8.16E+09	8.10E+09	1	ND	0.00E+00	8.10E+09	NA
1,1,1-Trichloroethane	8:40	34830688			0.00E+00	0		
RF		6.97E+09	7.19E+09	-3	ND	0.00E+00	7.19E+09	NA
Carbon tetrachloride	8:78	32871632			0.00E+00	0		
RF		6.57E+09	6.61E+09	-1	ND	0.00E+00	6.61E+09	NA
Benzene (PID)	8:99	148830			0.00E+00	0		
RF		2.98E+07	3.40E+07	-12	ND	0.00E+00	3.40E+07	NA
1,2-Dichloroethane	8:93	35939296			0.00E+00	0		
RF		7.19E+09	7.57E+09	-5	ND	0.00E+00	7.57E+09	NA
Trichloroethene	9:84	38834464			0.00E+00	0		
RF		7.77E+09	7.21E+09	8	ND	0.00E+00	7.21E+09	NA
Toluene (PID)	11:92	131905			0.00E+00	0		
RF		2.64E+07	2.93E+07	-10	ND	0.00E+00	2.93E+07	NA
1,1,2-Trichloroethane	12:47	33012256			0.00E+00	0		
RF		6.60E+09	6.59E+09	0	ND	0.00E+00	6.59E+09	NA
Tetrachloroethene	13:12	36329856			0.00E+00	0		
RF		7.27E+09	7.01E+09	4	ND	0.00E+00	7.01E+09	NA
1,1,1,2-Tetrachloroethane	14:69	35993120			0.00E+00	0		
RF		7.20E+09	6.48E+09	11	ND	0.00E+00	6.48E+09	NA
Ethylbenzene (PID)	14:68	116250			0.00E+00	0		
RF		2.33E+07	2.51E+07	-7	ND	0.00E+00	2.51E+07	NA
m,p-Xylene (PID)	15:69	293130			0.00E+00	0		
RF		5.86E+07	6.50E+07	-10	ND	0.00E+00	6.50E+07	NA
o-Xylene (PID)	15:69	120142			0.00E+00	0		
RF		2.40E+07	2.72E+07	-12	ND	0.00E+00	2.72E+07	NA
1,1,2,2-Tetrachloroethane	16:82	26044608			0.00E+00	0		
RF		5.21E+09	6.05E+09	-14	ND	0.00E+00	6.05E+09	NA

RT = retention time
RF = response factor
NA = not analyzed

ug/L = micrograms per liter
uL = microliter
ug = microgram

9/19/94

Analyst : David M. Pride

Reviewed by : Ragi Abraham

TABLE B-3
RESPONSE FACTORS FOR THREE POINT CALIBRATION
SUBJECT SITE
SEPTEMBER 19, 1994

PID\ELCD #1
FILE: 919A3PT.WK3

STANDARD CONC. (ug/L) INJECTION VOLUME(uL) COMPOUND/WEIGHT(ug)	RT	5000 0.50 0.0025	5000 1.00 0.0050	5000 2.00 0.0100	AVERAGE RESPONSE FACTOR	STANDARD DEVIATION	RELATIVE % STANDARD DEVIATION
Dichlorodifluoromethane	3:80	313455	569674	1639472			
CF		1.25E+08	1.14E+08	1.64E+08	1.34E+08	2.62E+07	19
Vinyl chloride	4:21	2555558	4885104	10705224			
CF		1.02E+09	9.77E+08	1.07E+09	1.02E+09	4.68E+07	5
Chloroethane	4:70	5342282	10026472	21694800			
CF		2.14E+09	2.01E+09	2.17E+09	2.10E+09	8.69E+07	4
Trichlorofluoromethane	4:94	9154118	19370064	42693920			
CF		3.66E+09	3.87E+09	4.27E+09	3.94E+09	3.08E+08	8
1,1,2-Trichloro-trifluoroethane	5:37	7920266	18085344	32377872			
CF		3.17E+09	3.62E+09	3.24E+09	3.34E+09	2.42E+08	7
1,1-Dichloroethene	5:65	10186848	23376704	51821952			
CF		4.07E+09	4.68E+09	5.18E+09	4.64E+09	5.54E+08	12
Methylene Chloride	6:16	16652992	33850880	70133440			
CF		6.66E+09	6.77E+09	7.01E+09	6.81E+09	1.80E+08	3
trans-1,2-Dichloroethene	6:48	13116880	28439504	63535008			
CF		5.25E+09	5.69E+09	6.35E+09	5.76E+09	5.57E+08	10
1,1-Dichloroethane	6:95	14184024	30309040	67494464			
CF		5.67E+09	6.06E+09	6.75E+09	6.16E+09	5.45E+08	9
cis-1,2-Dichloroethene	7:67	11681792	24869696	51919968			
CF		4.67E+09	4.97E+09	5.19E+09	4.95E+09	2.61E+08	5
Chloroform	7:88	18014944	39880704	91154240			
CF		7.21E+09	7.98E+09	9.12E+09	8.10E+09	9.61E+08	12
1,1,1-Trichloroethane	8:39	17339024	35706880	74815488			
CF		6.94E+09	7.14E+09	7.48E+09	7.19E+09	2.76E+08	4
Carbon tetrachloride	8:76	15717032	33002768	69562560			
CF		6.29E+09	6.60E+09	6.96E+09	6.61E+09	3.35E+08	5
Benzene (PID)	8:97	100833	165267	285184			
CF		4.03E+07	3.31E+07	2.85E+07	3.40E+07	5.96E+06	18
1,2-Dichloroethane	8:90	16570088	38435712	83864160			
CF		6.63E+09	7.69E+09	8.39E+09	7.57E+09	8.85E+08	12
Trichloroethene	9:81	15660984	36175328	81271232			
CF		6.26E+09	7.24E+09	8.13E+09	7.21E+09	9.32E+08	13
Toluene (PID)	11:94	81541	136268	279392			
CF		3.26E+07	2.73E+07	2.79E+07	2.93E+07	2.92E+06	10
1,1,2-Trichloroethane	12:49	16272288	33314224	65838912			
CF		6.51E+09	6.66E+09	6.58E+09	6.59E+09	7.70E+07	1
Tetrachloroethene	13:09	17040560	34118752	73940544			
CF		6.82E+09	6.82E+09	7.39E+09	7.01E+09	3.31E+08	5
1,1,1,2-Tetrachloroethane	14:68	17543216	33131808	57965856			
CF		7.02E+09	6.63E+09	5.80E+09	6.48E+09	6.23E+08	10
Ethylbenzene (PID)	14:70	64755	125034	244549			
CF		2.59E+07	2.50E+07	2.45E+07	2.51E+07	7.30E+05	3
m,p-Xylene (PID)	14:84	168417	297540	682112			
CF		6.74E+07	5.95E+07	6.82E+07	6.50E+07	4.80E+06	7
o-Xylene (PID)	15:70	83755	119731	240514			
CF		3.35E+07	2.39E+07	2.41E+07	2.72E+07	5.49E+06	20
1,1,2,2-Tetrachloroethane	16:65	17983728	30747072	47968756			
CF		7.19E+09	6.15E+09	4.80E+09	6.05E+09	1.20E+09	20

RT = Retention Time
CF = Calibration Factor

ug/L = Micrograms per Liter
uL = Microliter
ug = Microgram

9/19/94

Analyst: David M. Pride

Reviewed by: Ragi Abraham

APPENDIX C

SOIL GAS SURVEYING METHODS AND PROCEDURES

ENVIRONMENTAL SUPPORT TECHNOLOGIES, INC.

SOIL GAS SURVEYING METHODS AND PROCEDURES FOR NESTED SOIL GAS SAMPLING PROBES

Environmental Support Technologies, Inc. (EST) will perform soil gas surveys in accordance with Los Angeles Regional Water Quality Control Board (LARWQCB) "Requirements for Active Soil Gas Investigation" dated March 8, 1994. Some procedures may be modified based on evaluation of project needs. Modifications to these procedures, if necessary, will be approved prior to implementation and will be described in the soil gas survey report.

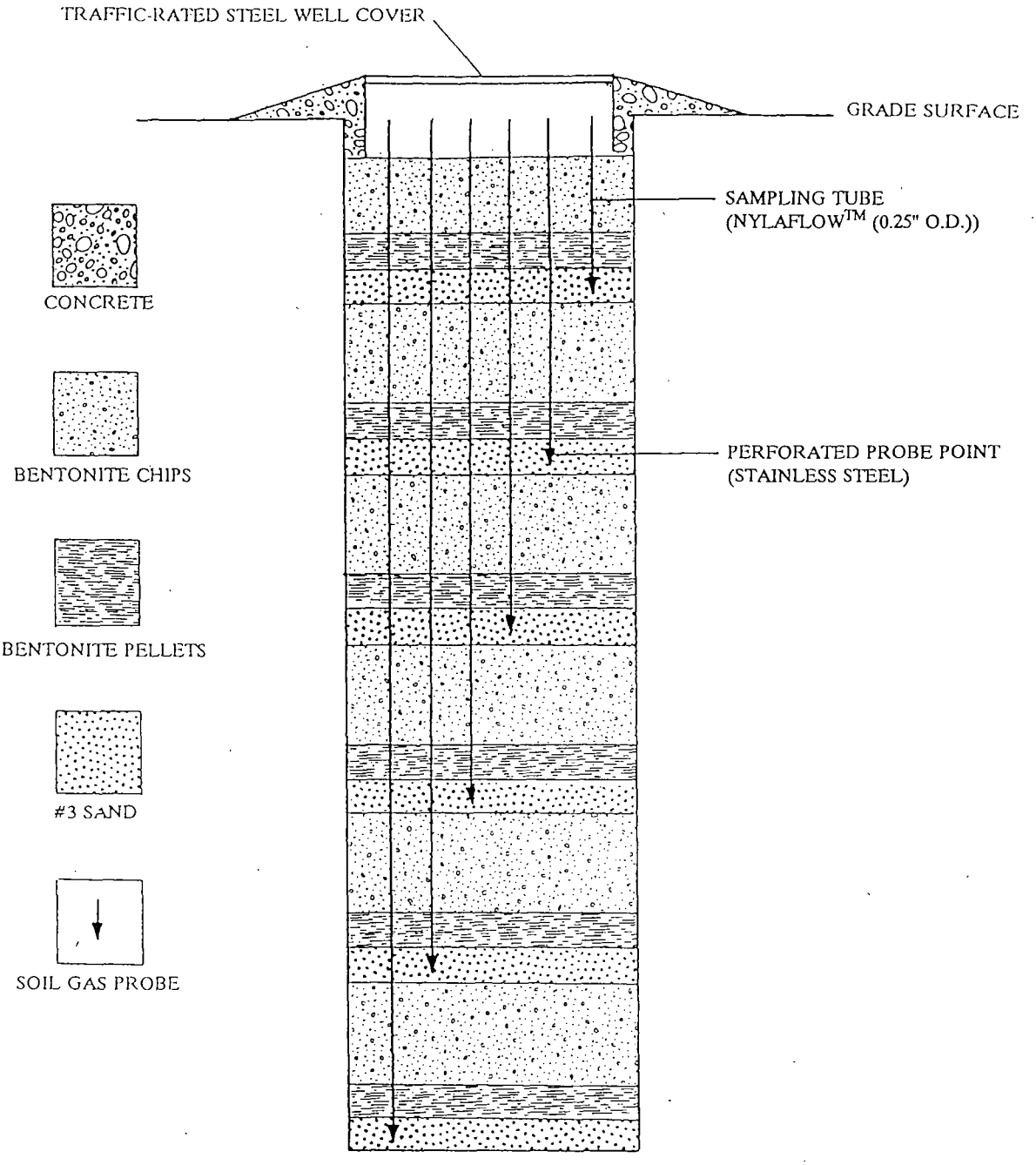
NESTED SOIL GAS PROBE INSTALLATION

Nested probes provide useful data for assessment of the vertical extent of potential soil contamination by VOCs at a particular point. Construction of a typical nested probe installation is shown in Figure 1. Details of typical nested probe construction are described below. Nested soil gas probes are typically installed at selected depths based on field screening of soil samples during drilling, or where a fine-grained lithology is encountered.

Upon drilling to total depth and completion of soil sampling, the soil boring will be converted to a nested probe installation. The borehole will typically be overdrilled by approximately one foot, and a total bore-hole depth measurement will be recorded. Depths below grade will be measured by sounding the borehole with a weighted engineer's tape graduated in 0.1-foot increments. The auger string will then be raised slightly and #3 Monterey sand will be poured down the hollow auger-stem until the boring has been backfilled approximately one foot, to the first depth of interest. A labeled and weighted soil gas probe will be lowered down the hollow auger-stem until the #3 sand-pack is encountered. The weighting of the distal end of the probe will ensure that the probe point remains in place during installation. Additional #3 Monterey sand will be added to the boring, burying the probe point and back-filling the boring to approximately one foot above the probe.

The two-foot-thick sand pack will allow for diffusion of soil gas into the sampling interval containing the probe point. In general, the sand pack should not exceed two feet in thickness. However, latest LARWQCB requirements for vertical profiling/nested probe soil gas surveys suggest that in deeper nested probe installations (greater than 100 feet below grade), the sand pack should extend approximately four feet above the probe point to allow for potential settling of the sand pack due to overburden pressure.

The sand pack interval will be capped with approximately 1.5-feet of bentonite pellets. Medium bentonite chips will then be used to back-fill the boring to about one foot below the next level of interest. The bentonite chips will then be hydrated and allowed to expand for about 15 minutes before introducing the next sand pack. The waiting period will allow the bentonite chips to hydrate, ensuring that potential downward migration of the sand pack material through the underlying bentonite materials will not occur.



VERTICAL SCALE:
1-inch = 1-foot
BOREHOLE DIAMETER EXAGGERATED FOR CLARITY

FIGURE 1
CONSTRUCTION DETAIL OF A TYPICAL
NESTED SOIL GAS PROBE INSTALLATION
ENVIRONMENTAL SUPPORT TECHNOLOGIES, INC.
SOIL GAS SURVEYING METHODS AND PROCEDURES

After the waiting period, another sand pack/probe interval will be constructed using the procedures described above. This procedure will be repeated until grade surface is reached and probe installation is complete. To complete the nested probe installation at grade, a heavy-duty, traffic-rated well cover will be fitted and cemented in place.

SOIL GAS SAMPLE COLLECTION AND HANDLING

About one month following installation, per LARWQCB requirements, soil gas samples will be collected from each probe and will be analyzed on site for LARWQCB target analytes, including volatile halogenated and aromatic hydrocarbons. Soil gas samples will be collected from the nested probes using the soil gas sampling system as shown in Figure 2. The soil gas sampling system is constructed of stainless-steel, glass, Nylaflow™, and Teflon™ components. Instrumentation associated with the sampling system includes a calibrated flow-meter and vacuum gage. Vacuum integrity of the sampling system will be tested prior to, and after the soil gas survey using leak-down testing methods.

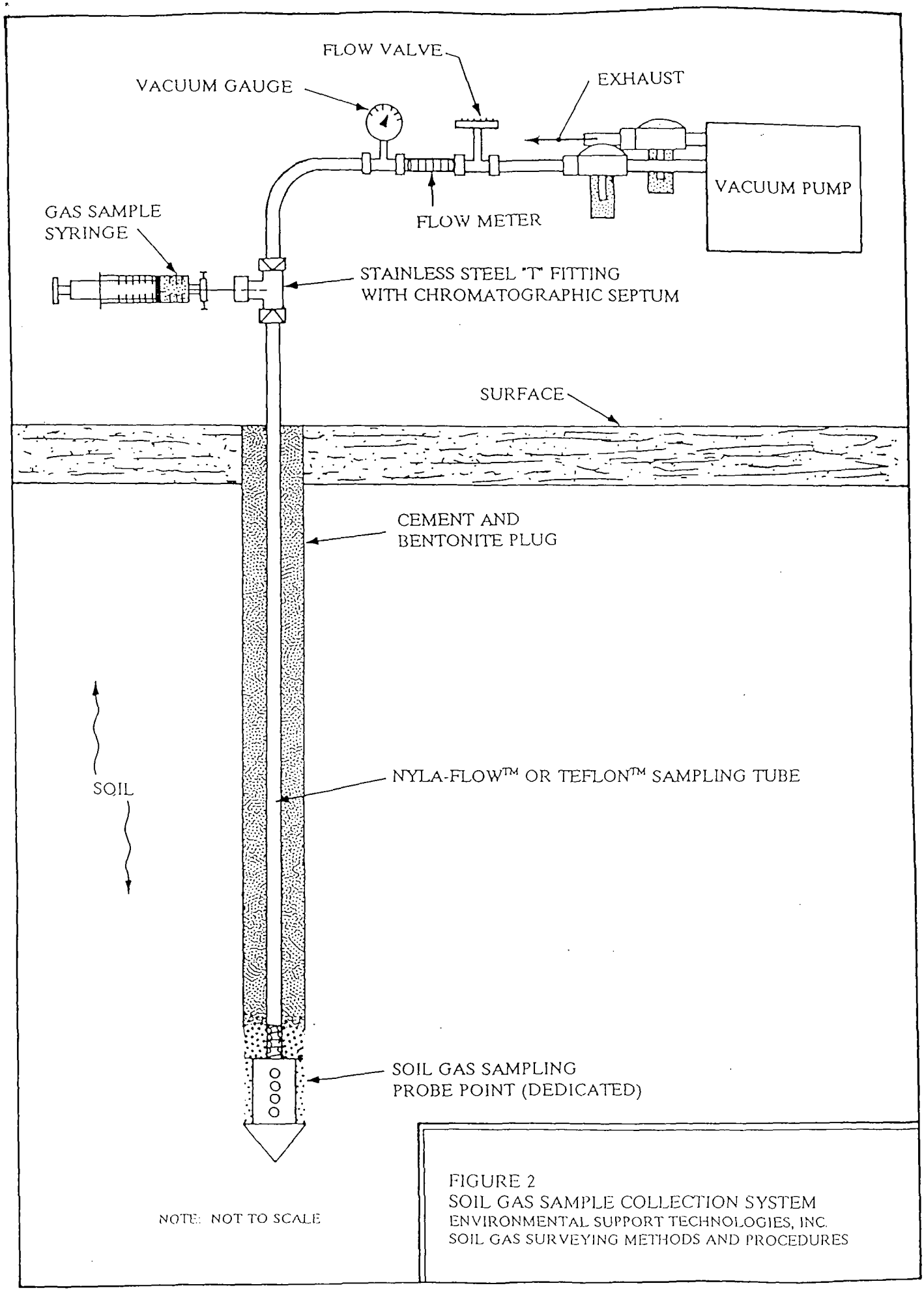
Nested soil gas sampling probes will be purged at a flowrate of approximately 100 milliliters per minute (mL/min). Site-specific probe purging and sample volume calibrations will be initially performed to evaluate the appropriate volume of gas to be purged from each probe prior to sample collection. This will be done by performing time-series sampling of at least one probe to evaluate trends in soil gas concentrations as a function of purge volume. If soil lithologies are consistent, a single determination will be adequate.

After probe purging, soil gas samples will be withdrawn from the moving sample stream using a glass syringe fitted with a disposable needle and Mininert™ gas-tight valve. Soil gas samples will be analyzed by direct gas injection into a laboratory-grade, field-operable gas chromatograph (GC).

SOIL GAS SAMPLE ANALYSES

Soil gas samples collected from nested probes will be analyzed in the field using a field-operable GC equipped with a photo-ionization detector (PID) and an electrolytic conductivity detector (ELCD). The PID and ELCD will be configured in-series to analyze for EPA Method 8010/8020 target compounds as specified in the LARWQCB requirements (March 8, 1994) including halogenated and aromatic hydrocarbons.

Detection limits for the LARWQCB target compounds will be no more than one microgram per liter (μg/L) of gas except when compound concentration exceeds the initial calibration range. Soil gas samples may be analyzed for other constituents on a site-specific basis. Other common analyses methods include total volatile hydrocarbons (TVHs) as gasoline, mineral spirits, or jet fuel, and selected ketones. A series of quality assurance/quality control (QA/QC) analyses will be performed prior to, during, and following the analysis of soil gas samples. A summary of these QA/QC analyses is shown in Table 1, and each analysis described below.



NOTE: NOT TO SCALE

FIGURE 2
SOIL GAS SAMPLE COLLECTION SYSTEM
ENVIRONMENTAL SUPPORT TECHNOLOGIES, INC.
SOIL GAS SURVEYING METHODS AND PROCEDURES

TABLE 1

SUMMARY OF
QUALITY ASSURANCE/QUALITY CONTROL ANALYSES
FOR SOIL GAS SURVEYS

CALIBRATION AND LABORATORY CONTROL SAMPLES		
DESCRIPTION	FREQUENCY	PRECISION GOAL %RSD or %DIFF
INITIAL THREE–POINT CALIBRATION (25 Target Compounds)	At the beginning of the soil gas survey, unless the RPDs of the initial laboratory check sample or daily mid–point calibration check samples exceed their goals.	20–30 (1)
INITIAL LABORATORY CONTROL SAMPLE (LCS) (25 Target Compounds)	At the beginning of the survey, following the initial three–point calibration.	15 (2)
DAILY MID–POINT CALIBRATION CHECK (12 Target Compounds)	At the beginning of each day.	15 (3) 25 (3)
LAST GC TEST RUN (12 Target Compounds)	At the end of each day.	20 (4)
FIELD CONTROL SAMPLES		
DESCRIPTION	FREQUENCY	PRECISION GOAL
BACKGROUND SAMPLE (5)	Minimum one per day.	N/A
SYRINGE BLANK (5)	Minimum one per day.	N/A

%RSD = Percent Relative Standard Deviation calculated based on the initial three–point calibration.
%DIFF = Percent Difference between the response factor obtained from the LCS, the daily mid–point calibration, or the last GC test run and the average response factor initially calculated based on the three–point calibration.
N/A = Not applicable.
(1) The %RSD goal for the initial three–point calibration will be 20 percent for all compounds except for Freon 11, Freon 12, Freon 113, chloroethane, and vinyl chloride for which the %RSD goal is 30 percent.
(2) The %DIFF goal for the LCS will be 15 percent for all target compounds.
(3) The %DIFF goal for the daily mid–point calibration check will be 15 percent for all compounds except for Freon 11, Freon 12, Freon 113, chloroethane, and vinyl chloride for which the %DIFF goal is 25 percent.
(4) The %DIFF goal for the last GC test run will be 20 percent for all compounds except for Freon 11, Freon 12, Freon 113, chloroethane, and vinyl chloride for which the %DIFF goal is 30 percent.
(5) A syringe/background sample will be analyzed using ambient air. If volatile organic compounds (VOCs) are not detected, the ambient air sample will represent the background sample and syringe blank. If VOCs are detected in the ambient air sample, a syringe blank will be analyzed using ultra–high–purity helium or nitrogen gas.

INITIAL MULTI-POINT EQUIPMENT CALIBRATION

The GC used for soil gas analyses will be calibrated using high-purity solvent-based standards obtained from certified vendors or using gas standards prepared in the field (for TVHs). Standards are typically prepared in high-purity methanol or dodecane solvent. Calibration using solvent-based standards will typically be performed using varying injection volumes of the stock solvent-based standard without dilution. If necessary, stock solvent-based standards will be diluted to an appropriate concentration. Diluted standards will be prepared by introducing a known volume of stock solvent-based standard into a known volume of high-purity solvent.

Initial GC calibration will be performed for EPA Method 8010/8020 compounds. The GC will be calibrated using three standard injections to establish a three-point calibration curve. The lowest standard will not be higher than five times the method detection limit (or 5 μg/L). The percent relative standard deviation (%RSD) of the response factor (RF) for each target compound will not exceed 20 percent except for trichlorofluoromethane (Freon^{TM}-11), dichlorodifluoro-methane (Freon^{TM}-12), trichlorotrifluoromethane (Freon^{TM}-113), chloroethane, and vinyl chloride which will not exceed 30 %RSD. Identification and quantitation of compounds in the field will be based on calibration under the same analytical conditions as for three-point calibration.

LABORATORY CONTROL SAMPLE (LCS)

A laboratory control sample (LCS) from a source other than the initial calibration standard will be used to verify the true concentration of the initial calibration standard. The LCS will include the LARWQCB target compounds and the RF for each compound will be within +/- 15 percent difference from the initial calibration.

DAILY MID-POINT CALIBRATION CHECK

Daily field calibration of the GC will consist of a mid-point calibration analyses using the same standard as used for the initial multi-point calibration. The daily mid-point calibration check will include the 12 target compounds as specified in the previously referenced LARWQCB requirements. The RF of each compound (except for Freons^{TM}-11, -12, and -113, chloroethane, and vinyl chloride) will be within 15 percent difference of the average RF from the initial calibration. The RF for the Freons^{TM}-11, -12, and -113, chloroethane, and vinyl chloride will be within 25 percent difference of the initial calibration. If these criteria are not met, the GC will be re-calibrated. Daily calibration will be performed prior to the first sample analysis of the day. One-point calibration will be performed for all compounds detected at a particular site to ensure accurate quantitation. Subsequent calibration episodes, if deemed necessary, will consist of at least one injection of the standard exhibiting a similar detector response as that of samples encountered in the field.

BLANK INJECTIONS

The syringes used for soil gas sample collection will be filled with ambient air or high-purity carrier-grade gas from a compressed gas cylinder. The ambient air or high-purity gas will be injected directly into the GC. The blank injection will serve to detect contamination of the syringe to be used for sampling and verify the effectiveness of equipment decontamination procedures.

END OF DAY GC TEST RUN

A LCS will be analyzed at the end of each day. The LCS will contain the same compounds as the daily mid-point calibration standard (minimum 12 compounds). The LCS must be from a second source independent from the initial multi-point calibration standard. The RF for each compound will be within 20 percent difference of the average RF for the initial calibration. If this criteria is not met, additional LCS will be analyzed to satisfy this criteria.

DECONTAMINATION PROCEDURES

Sampling equipment in contact with the soil gas sample stream will be decontaminated prior to initiation of sampling and prior to collection of each soil gas sample. Decontamination of soil gas sampling equipment will be conducted by by baking in the gas chromatograph oven at approximately 160° Celsius.

SHORTENING THE GC RUN TIME

Shortening the GC run time is acceptable only if the chemist feels that doing so will not sacrifice the quality of data obtained and doing so meets the approval of appropriate client and agency personnel.

COMPOUND CONFIRMATION SAMPLE

As a means of compound confirmation, EST will collect one soil gas sample from a selected probe in a Tedlar™ bag for off-site analysis by a certified laboratory using gas chromatography/mass spectrometric (GC/MS) methods.

REPORTING OF SAMPLE RESULTS AND QA/QC INFORMATION

Reporting of sample results and QA/QC information will be performed in accordance with the Los Angeles Regional Water Quality Control Board's "QA/QC and Reporting Requirement for Soil Gas Investigation" dated March 8, 1994.

VAPOR MONITORING EVENTS

Latest LARWQCB requirements for vertical profiling/nested probe soil gas surveys require a minimum of three vapor monitoring events to evaluate the consistency of the data.